

tinned to the end of the month as follows: 22d, E. 42 miles; 23d, NE. 33; 24th, SE. 40; 25th, SE. 32; 30th, E. 32; 31st, SE. 28. Austin, Tex., 1st, heavy northwest gale, which at times almost reached the violence of a tornado. Fences and trees were blown down and many buildings unroofed. Several houses were entirely demolished. Astoria, Or., 9th, violent southerly gale causing considerable damage to shipping in the harbor and in the city to signs, show windows, fences, shade trees and out-buildings. Ilwaco, Or., 9th, large ware-house leveled to the ground and several buildings unroofed. "The road across the portage to the weather beach was obstructed with fallen trees to such a degree that it will require a week's work to clear away the debris. From shore to shore across the Columbia bar the river was one mass of seething, milky foam, with tremendous sea." Rock Island, Ill., 21st, violent storm of wind and rain; a large portion of the government bridge, a solid stone and iron structure, was blown down; many buildings more or less damaged. Duluth, 21st, very violent wind storm from NNE., accompanied by driving snow. The sea on Lake Superior ran exceedingly high and all ice in the harbor was broken up. The suspension bridge over the canal badly damaged and rendered impassable. The wind and waves formed a huge breakwater of ice along the exposed shore. Pine Bluffs, Ark., 2d, "violent and desolating wind storm" passed over a portion of Jefferson county, laying waste cabins, houses, fences and trees. One person was killed and several injured. Findlay, Ohio, 21st, violent wind storm during early morning. Numerous out-buildings and fences demolished, trees uprooted. Buffalo, 22d, violent southwesterly gale. In some portions of the city it seemed to attain the violence of a tornado. For a space of about three minutes the anemometer registered a velocity of 80 miles per hour. A waterspout was reported to have been seen on Lake Erie between this city and Erie about the time the gale struck Buffalo. Umatilla, Or., 16th, heaviest wind storm experienced at this station for several years. Began at 10 a. m., violence gradually increasing. At 1 p. m. wind velocity 40 miles per hour, soon after reaching the maximum velocity of 56 miles from the north, when the wind suddenly died away. Dense clouds of sand filled the air and no one ventured out of doors; all business suspended. The sand and gravel dashed against windows and the sides of buildings, making a noise similar to that of heavy sleet. Olympia, Wash. Ty., 9th, heavy wind storm from south, accompanied by rain, which began at 11 a. m. Trees, fences and out-buildings were blown down, signs torn off and windows broken. Maximum velocity, 42 miles per hour, continued from 2.15 to 2.30 p. m. Delaware Breakwater, 4th, terrific storm prevailed throughout the day, the wind reaching a velocity of 56 miles. The sea washed over the office building, filling the rain-gauge and breaking down the wires of the "Breakwater air line." Schooner *Ellen Rockland*, from Portland to Norfolk, ran on the ice-break at 8.30 a. m. Eastport, Me., 5th, one of the severest storms that has visited this section for a long time. Two vessels went ashore near West Quoddy; others lost deck loads. 22d, very severe storm; about 50 feet of the breakwater to the entrance of Houstin's ship yard was destroyed, entailing a loss of about \$500. Several wharves were slightly damaged. New Haven, 21st, heavy gale; ten canal boats, loaded with coal, were sunk off Bridgeport, involving a loss of \$3,700. Chincoteague, Va., 1st, Schooner *Dolly Varden* wrecked on the beach during gale. New Orleans, 3d, 8.20 p. m., during heavy gale steamers *Thomas Dean* and *Frank Porgoud* were driven from their moorings and crushed the N. O. Pacific R. R. wharves, causing a large amount of damage. A coal fleet of ten barges were sent adrift, five of which were sunk in mid-stream; loss estimated at \$5,000. Mobile, 28th, between 9 a. m. and 1 p. m., severe wind and rain storm; telegraph lines prostrated; considerable damage done. Little Rock, 27th, 7.30 to 10.30 p. m. severe storm accompanied by thunder and heavy rain; streets were deluged; in some places water reached a depth of 3 feet. The electric display was unusually brilliant. The air was so charged with ozone that the odor was very ap-

preciable and persons subject to catarrhal affection complained of the irritating effect produced upon the throat and lungs. Several cases of damage from lightning have been reported. Columbus, Ohio, 21st, 6 p. m., severest storm experienced for years. In less than half an hour the wind increased from 10 to 40 miles per hour; buildings, chimneys, fences, etc., were blown down. Hogansville, Ga., 28th, violent wind storm; several houses destroyed. Spiceland, Ind., 21st, 3 to 3.30 a. m., very high winds, out-buildings blown down and unroofed, trees, etc., blown down. Coalville, Utah, 9th, and 16th, heavy wind storms; large number of trees were blown down and the water in the Sound made very rough.

### VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily indications for February, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 87.16 per cent. The percentages for the four elements are: Weather, 86.44; Direction of the Wind, 84.25; Temperature, 88.15; Barometer, 89.72 per cent. By geographical districts they are: For New England, 90.1; Middle Atlantic States, 92.5; South Atlantic States, 86.9; Eastern Gulf States, 85.8; Western Gulf States, 86.9; Lower Lake Region, 88.5; Upper Lake Region, 84.5; Tennessee and the Ohio Valley, 87.8; Upper Mississippi Valley, 86.1; Lower Missouri Valley, 81.1; Northern Pacific Coast Region, 98.2; Middle Pacific Coast Region, 97.1; Southern Pacific Coast Region, 93.7. There were 100 omissions to predict (37 being due to the absence of reports from the Pacific coast) out of 3,444, or 2.90 per cent. Of the 3,344 predictions that have been made, 126, or 3.77 per cent. are considered to have entirely failed; 119, or 3.56 per cent. were one-fourth verified; 351, or 10.50 per cent. were one-half verified; 159, or 4.75 per cent. were three-fourths verified; 2,589, or 77.42 per cent. were fully verified, so far as can be ascertained from the tri-daily reports.

*Cautionary Signals.*—139 Cautionary signals were displayed during the month of February, 1882, of which 130, or 93.52 per cent. were fully justified by winds of twenty-five miles per hour, or over, at or within a radius of 100 miles of the station. 76 Off-shore signals were displayed, of which 60, or 78.94 per cent. were fully justified; 68 or 89.47 per cent. were justified as to direction; 76, or 100.0 per cent., were justified as to velocity. 52 Off-Shore signals were changed from Cautionary. Two Northwest signals were displayed, both of which were fully justified. 217 signals of all kinds were displayed, of which 192 or 88.48 per cent., were fully justified. The above does not include signals ordered at 69 display stations, where the velocity is only estimated. 183 winds of 25 miles or more, were reported, for which no signals were ordered. 27 signals were ordered late.

### NAVIGATION.

*Stage of Water in Rivers.*—In the table on the right-hand side of chart No. III are given the highest and lowest stages of water as observed at Signal Service stations during the month of February, 1882. Throughout the Lower Mississippi and Ohio Valleys and along the Red and Arkansas rivers the heaviest floods for years prevailed during the month. In consequence the stage of water in these rivers has been remarkably high, as shown by the following figures: The Red River reached its highest stage at Shreveport on the 21st, being 31 feet and 5 inches above low water-mark, or 18 inches above the danger-line. The Arkansas river reached its highest stage at Little Rock on the 24th, being 21 feet and 8 inches above low water mark. The Missouri was frozen over during the month at Yankton, but reached its highest stage (a very moderate one) on the 14th at Leavenworth, and on the 27th and 28th at Omaha. The Mississippi remained frozen during the month at St. Paul and LaCrosse, and at a low stage from the 1st to 28th at Dubuque, Davenport and Keokuk. From St. Louis to New Orleans reached its highest stage as follows: St. Louis, 22nd, 28 feet and 3 inches above low-water mark, or 21 inches

below the danger-line; Cairo, 25th and 26th, 51 feet and 10½ inches above low-water mark, or 11 feet and 10½ inches above the danger-line; Memphis, 28th, 35 feet and 7 inches above low-water mark, or 19 inches above the danger-line; Vicksburg, 28th, 44 feet and 8 inches above low-water mark, or 3 feet and 8 inches above the danger-line; New Orleans, 28th, 15 inches above the danger line. The Ohio river reached its highest stage at the various stations as follows: Pittsburgh, 22nd, 21 feet and one inch above low-water mark, or 13 inches above the danger-line; Cincinnati, 21st, 58 feet and 7 inches above low-water mark, or 8 feet and 7 inches above the danger-line; Louisville, 22nd, 37 feet and 2 inches above low-water mark, or 38 inches above the danger line. The Cumberland at Nashville reached its highest stage on the 1st, 43 feet and 6 inches above low-water mark, or 18 inches above the danger-line. The Tennessee at Chattanooga reached its highest stage on the 1st, 29 feet and 11 inches above low water mark, or 13 inches below the danger-line. The Monongahela remained at a moderate stage throughout the month; highest water at Morgantown on the 9th, and at Pittsburgh on the 22nd. No marked change occurred in the Savannah, Williamette, Sacramento, Mobile and Colorado rivers; those in the extreme western States reached their highest stage on the 27th.

*Ice in Rivers and Harbors.*—*Connecticut River*: New Haven, 17th, ice broke up. Woodstock, Vt., 28th, river nearly clear of ice. *Delaware River*: Cocheton, 14th, heavy ice gorges, village flooded; several buildings crushed by the ice and carried down the river. *Hudson River*: Newburg, 14th, river open at this point after having been closed since January 23d. Poughkeepsie, 14th, all ice south of Fort Montgomery is on the move. Albany, 14th, ice began moving; 17th, moved down about 19 miles and gorged on a bar at Doves Point causing the water to back very rapidly, which shortly afterwards was running at the rate of seven miles per hour in upon the city, flooding stores and cellars and causing considerable loss to merchants; 18th, river almost free of ice; 19th, river entirely free of ice; 22d, 23d, 24th, floating ice; 25th, frozen over. *Columbia River*: Umatilla, Or., 18th, river frozen; 19th, full of floating ice; 26th, clear of ice. Portland 21st, floating ice. *Palouse River*: Colfax, Wash. Ty., 28th, ice broke up during p. m. *St. Clair River*: Port Huron, 1st, river clear of ice; 2d, 5th, 6th, 8th, 22d, 23d, floating ice. *Grand River*: Grand Haven, 1st, free of ice; 14th, first sailing vessel of season arrived. Lansing, 21st, river closed; 25th, river open. *Rock River*: Rockford, Ill., 23d, frozen over; 26th, ice going out. *Housatonic River*: South Lee, Mass., 17th, ice passed out of the mill-ponds on the river as far up as Pittsfield; no damage done to mills or bridges. *Thunder Bay*: Alpena, 12th, floating ice; 13th, clear of ice; 18th, 19th, partly frozen. *Thunder Bay River*: Alpena, 13th, partly clear of ice; 16th, clear of ice, navigation open; 18th, 19th, partly frozen. *Lake Superior*: Duluth, 22d, lake frozen. *Lake Michigan*: Marquette, 5th, harbor frozen. *Lake Erie*: Cleveland, 6th, ice disappearing; 11th, ice broke up and floated out into the lake. Toledo, 25th, navigation open; 27th, navigation fully open for coasting vessels. *Sandusky Bay*: Sandusky, 11th, ice moved slightly; 12th, ice becoming very soft; 13th, ice entirely disappeared from bay; 23d, bay frozen over; 28th, ice in bay softening. *Maumee River*: Toledo, 13th, ice breaking up; 14th, river fully open, harbor clear of ice. *Niagara River*: Buffalo, 14th, ice moving out of river. *Oswego River*: North Volney, N. Y., 19th, river frozen. *Lake Champlain*: Charlotte, Vt., 4th, partially closed by ice; 15th, much floating ice; 23d, lake closed; 28th, ice moving in middle of lake. *Mississippi River*: Burlington, 10th, ice breaking up; 11th, on the immediate front, and on the Illinois side, the ice completely broke up and passed out; 12th, clear of ice; 22d, large quantity of floating ice; 23d, 24th, 25th, floating ice. Dubuque, 4th, ice becoming unsafe for crossing; 6th, breaking up; 11th, melting rapidly, river nearly clear in front of levee; 12th, ice gorge broke at 10 a. m. near Eagle Point; 11 p. m. river full of ice; 4 p. m., nearly clear, ferry-boat running;

21st, 23d, floating ice, ferry-boat making trips with great difficulty, ice 10 inches thick in sloughs and lakes. ice cutting resumed; 26th, clear of ice. Keokuk, 22d, river full of floating ice; 27th, free of ice. La Crosse, 13th, ice becoming weak, crossing thereon suspended. St. Paul, 27th, ice gathering suspended, ice unsafe for crossing. Clinton, Iowa, 12th, clear of ice, navigation open; 22d, 23d, heavy drift ice. Guttenburg, Iowa, 12th, ice broke up. Muscatine, Iowa, 6th, ice broke up at 1 p. m.; 7th, ferry boats running. *Missouri River*: De Soto, Nebr., 12th, ice broke in river. Omaha, 13th, river open and gorged; 14th, river open; 21st, frozen; 26th, ice breaking up; 27th, river open. Leavenworth, 7th, slush ice in river; 9th, clear of ice; 21st, 22d, 23d, 24th, slush ice in river; 25th, clear of ice.

*Floods.*—The remarkably heavy rains of the last half of January in the Ohio, Central and Lower Mississippi Valleys considerably abated during February, but the severity of the floods did not. The rain continued incessant and moderately heavy in these regions, and the destruction of life and property together with the exceedingly high stage of water was in many places without precedent. *Alabama*: Montgomery, 2d, great damage throughout the central portion of the State by heavy floods along the Warrior, Bigbee and Tombigbee rivers. *Arkansas*: Helena, 17th, river 3½ inches above the highest water ever known and slowly falling. The levee broke at a point about two miles below the city and again near Westover, submerging the country for a distance of several miles. The embankment of the Iron Mountain and Helena R. R., leading out from the levee was washed away for a considerable distance; all telegraph wires along the railroad carried away. The Midland R. R., flooded and entirely useless. All low lands south of the city submerged, resulting in great distress and loss of property; business entirely suspended. 20th, the principal streets in the central portion of the city, flooded and skiffs and dug-outs are the only means of transportation. Water in the city rising steadily with great destruction of property. Much destitution and distress in the overflowed districts. 24th, river falling at the rate of half an inch every 24 hours. Several miles of the Mobile and Northwestern R. R. washed away. Just below the city 32 plantations, comprising more than 12,000 acres, are all under water. From Memphis to Madison, Ark., a distance of 40 miles to the west, "there is nothing but one wide expanse and waste of water." Little Rock, 20d, river reached the danger-line at 9 p. m.; water covered with floating logs, trees, etc. Owing to a break in the levee 30,000 acres of valuable cotton lands were flooded. 24th, river about 24 feet above low-water mark and rising at the rate of one inch per hour. 25th, river commenced falling. Terry's Ferry, 24th, Arkansas river above its banks and the water rising rapidly; large tracts of land overflowed. Adamsburg, 24th, nearly the entire town inundated and the whole of Pastoria county under water; river now running through Flat Bayou. Pine Bluff, 24th, river above its banks and much damage caused to property. Desha's, 24th, "loss of property by flooding very extensive;" water over three feet deep on the north bank. Morianna, 14th, Longville river unusually high, water over the railroad trestle and all trains delayed. Clarendon, 20th, White river overflowed and the water rising steadily. Chicot, 2d, country flooded for miles; heavy breaks in all the levees and water rising with great rapidity. "People moving their household effects on improvised rafts." *Canada*: Warkworth, Ontario, 1st, Mill river overflowed and considerable property damaged. St. Jacques Achigan, Quebec, 1st, very heavy rains; water so high that people were compelled to move their household property and stock and abandon their homes; highest water ever experienced here. Montreal, 2nd, owing to heavy rains and the rapid melting of the snow in elevated portions of the city, the western section was inundated to a depth of from 4 to 10 feet. "People moved about on improvised rafts;" Grand Trunk Railroad submerged to a depth of from 4 to 6 feet; all travel suspended. *Illinois*: Carlisle, 24th, Okawa river above its banks and considerable property

destroyed; two railroad bridges carried away and travel suspended; passengers transferred in boats to the Vandalia, Ohio and Mississippi trains. Carlinville, 21st, unusually heavy rain for the past 48 hours; all trains abandoned, bridges and houses swept away and great damage to farms situated in the low lands. Vandalia, 21st, Okawa river overflowed and the bottom lands, comprising an area of about five miles square, submerged to a depth of from 6 to 10 feet. A large amount of live stock and lumber swept away. Water higher than at any time since 1875 and still rising; many highway bridges swept away. Bellville, 20th, continued rain for the past 48 hours caused all streams to overflow their banks, flooding fields and doing considerable damage to buildings and fences; track of the Louisville and Nashville R. R. across Silver creek bottom submerged and all trains delayed. Alton, 20th, immense damage to city and railroad property; incessant rain for past 48 hours. Macoupin creek overflowed and all communication with Springfield and Chicago cut off. Wood river overflowed and many farms under water; the river rose from 25 to 30 feet and swept everything before it. In the Wood river bottoms the destruction of property is without parallel in the history of that section of the State. Alton Junction completely inundated; highest water ever known. Springfield, 20th, heavy rains for the past 48 hours. All streams rose with unparalleled rapidity; low lands covered with water from 6 to 12 feet deep. Sangamon river and Lick, Hurricane and Macoupin creeks, 45 miles below this point, higher than ever before known. Railroad travel suspended and telegraphic communication cut off; several heavy bridges washed away. Salem, 20th, country flooded for miles about; many bridges in the country washed away; railroad travel suspended and highways impassible. Mt. Vernon, 23d, heaviest flood for years; great damage to farm property. Mascoutah, 23d, Silver creek overflowed; surrounding country flooded and travel generally impeded. Jerseyville, 20th, highest water for the past 40 years; rain continued without cessation for 36 hours; bridges, fences and buildings washed away. Shelbyville, 20th, Okaw river overflowed; water higher than during the great freshet of 1875; bottom lands completely submerged and all crops a total loss. Tuscola, 20th, great portion of the city under water; flood unprecedented; great damage to property; all trains delayed and telegraphic communication cut off. White Hall, 20th, heaviest rain for many years; great damage to farm and city property and considerable loss of stock; railroad tracks submerged and all travel suspended. Lebanon, 20th, heaviest rain for many years; streams higher than ever before known. Many farms inundated, causing great damage to the wheat crop. Bridges and fences destroyed, incurring a large loss in this respect. Effingham, 20th, rain fell resolutely for past 48 hours. Bridges washed away and all railroad travel suspended. Peoria, 20th, very heavy rains during the past two days, but no damage from overflow. River about 10 feet above low-water mark. Cairo, 23d, 12 m., water reached the top of river gauge, 51 feet above low-water mark or 11 feet above the danger-line. 24th, 1 p. m., break occurred in new levee, but was checked without damage to property, and on the morning of the 26th a similar break occurred with similar results. To provide against overflow for the past few days has cost the city over \$17,000. The water, which owing to great pressure has filtered through the levee, together with the enormous quantity which has fallen during the past few weeks has about inundated the city. In many places the streets were under water and cellars were flooded. Should this "sipe water," as it is termed, rise eight inches higher every street and walk in the city would be under water. At its present stage the water is the highest ever known in this city and the quantity and general extent is unprecedented. 25th and 26th, water in the Ohio reached 51 feet and 10½ inches above low-water mark, or 11 feet 10½ inches above the danger-line, the highest water ever known here. Charleston, 20th, Cossell, Riles and Kickapoo creeks about 10 feet above low-water mark, or 6 inches lower than the flood of 1881; considerable damage to

property. 21st, Embarrass river higher than ever before known, being 31½ inches higher than the great flood of August 2d, 1875; the river rose about 24 feet above low water, or 8 feet above danger line. Damage to the extent of thousands of dollars has been done to bridges, fences, etc., in Coles County. Indiana: Madison, 19th, starch factory, saw mills, ship yards, cooper shops and cellars on Ohio street, and the railroad depot flooded; river still rising. New Albany, 21st, large amount of damage to private property; 600 houses under water; portions of city along river front flooded for a distance of two miles; all manufacturing establishments closed. Over 100 feet of the trestle-work, of the Air Line R. R., was washed away. Heavy washouts on other railroads in vicinity. The flood of 1847 lacked two feet of reaching the high-water mark of 1832, while the flood of 1867 was 4½ feet below that of 1832. The flood of 1869 was six inches below that of 1867, and was very destructive to property along the river, as it came on very suddenly. The flood of 1868 was 18 inches below that of the following year. The present flood is still below the high-water mark of 1867. Aurora, 21st, 4 p. m., river higher than during the great flood of 1847; water rose two inches per hour for the past 24 hours. In many streets water from 4 to 6 feet deep; people compelled to move to the second story of their dwellings. Lawrenceburg, 21st, since the night of the 20th all communication with the town was cut off; "almost the entire place was a sea of muddy water;" railroads all washed out, highways submerged and no steamers could effect a landing. About 3,000 people were rendered homeless. "The water attained a depth of 12 feet in the streets and rushed through them with terrible force. Horses, cattle and hogs were left to their fate and soon the rushing torrent was covered with their bodies." The destruction of property and the terrible misery accompanying the ravages of this flood are without precedent in the history of this section of the State. Evansville, 21st, river remarkably high for past six weeks; river now above its banks and steadily rising. The Kentucky shore entirely submerged to the tops of the trees; 6 p. m., water 43 feet and 5 inches above low-water mark. 22d, water 44 feet above low-water mark or 2 feet and 3 inches below the highest water ever known, the great flood of 1867. Orleans, 21st, country for miles about deluged with rain; over 20 squares of northwest portion of city flooded from one to six feet deep. Lost river overflowed, washing away fencing and buildings; hogs and sheep drowned in considerable numbers. Terre Haute, 21st, Wabash river rose 66 inches in past 21 hours and still rising at the rate of 2½ inches per hour, with 21 feet in the channel. Railroads badly damaged and all communication suspended. Highest rise of late years occurred in 1875, when there was 27 feet and 8 inches in the channel. Madison, 21st, river rising rapidly, water within two feet of the great flood of 1847. Nearly 1000 people thrown out of employment; manufactories and residences flooded; great damage to private as well as corporate property. Hagerstown, 20th, heavy rain for the past 48 hours. Many streams "bank full" and others spreading over the surrounding country. Vevay, 18th, Ohio river "over its boundaries;" lower part of city inundated, creeks and streams much swollen. 19th, river still rising, people leaving their homes; all the adjacent lands along the river submerged; many frame buildings floated away. 21st, much lumber and many sawlogs have floated away. 22d, river beginning to recede. 23d and 24th, river falling slowly. Laconia, 22d, Ohio river reached its highest point to-day; as compared with former great floods, it is as follows: 34 inches below the flood of 1847; 33 inches above that of 1853; and 1 inch above that of 1867. The bottom lands overflowed, causing immense damage to property. St. Meinrad, 21st, Anderson creek higher than ever before known. Rising Sun, 21st, Ohio river higher than at any time since the great flood of 1847. Indian Territory: Ft. Gibson, 21st, river rising rapidly, and full of driftwood. Kentucky: Covington, 19th, water over the side walks near the suspension bridge; river rising rapidly. Carrollton, 19th, principal streets several feet under water; Kentucky river un-

usually high and rising rapidly; 20th, over 40 dwelling houses, two hotels, two saw mills and much other property flooded by high water. About 60 families have been rendered homeless. Most of the highway bridges in the surrounding country have been washed away. Milton, 19th, many of the streets several feet under water; considerable destruction of property. Catlettsburg, 21st, heavy land slides along the railroad lines and much damage to property in the surrounding country. Louisville, 19th, river rose nearly 2 feet during the past 24 hours and still rising, with 29½ feet in the canal and 27½ feet in the chute on the falls. Fourth street cut off by water from all communication with the river; all cellars and first floors in that vicinity flooded. 20th, water rising at the rate of 2 inches per hour. In some portions of the city water 4 to 6 feet deep. Most of the distilleries compelled to close and many manufactories surrounded by water. Highest water since 1867. 22d, river reached its highest point; much damage has been sustained by manufacturers and others living along the river front. 23d, river falling. *Louisiana*: Lake Providence, Carroll co., 2d, county flooded for miles and people compelled to abandon their homes. Heaviest flood for past 30 years. The flood of 1844 was exceeded about 2 feet by that of 1858, the latter about 2 feet by the flood of 1862; the flood of 1862 was exceeded about 18 inches by the flood of 1876 and 1877, and 34 inches by the flood of 1882. Longwood, 2d, levee broken in several places; plantations flooded and most of the negro cabins swept away; country very desolate. Shreveport, 4th, heavy rain for past 36 hours. The lakes above the city higher than for the past six years. 20th, the high stage of water in the river seriously threatened plantation property, gin houses, stock, etc. Breaks in the levees are reported daily and cause great excitement among planters. New Orleans, 11th, a crevasse 300 feet wide and from 2 to 4 feet deep occurred at Kemp Levee, in Tensas Parish. *Mississippi*: Greenville, 25th, levee broke between Easton Landing and Mound City, flooding the surrounding country. Damage to levees amount to over \$500,000. At Bolivar the levee is "broken as far as the eyecan reach." The levee system is a general wreck; nearly the whole of Bolivar and Washington counties inundated. *Missouri*: St. Louis, 20th, remarkably heavy rains; cellars flooded, sewers obstructed and great damage to embankments and streets. Damage to railroad property in the vicinity of the city unusually large, blockade to railroad travel unprecedented; no trains for 48 hours. About 500,000 feet of lumber carried off by the high water. Rise in the river the most rapid known for the past 35 years. So sudden and great was the rise in the Mississippi between Memphis and Vicksburg that over 270 steamship landings were abandoned in two days. At Forest Park the carp ponds were consolidated into one vast sheet of water. The River des Peres flowing through the park rose above its banks, a condition never before observed by the oldest resident in the neighborhood. Owing to the rapid rise of the water, much freight on the levee, supposed to be out of danger, was submerged before it could be removed. Rosedale, 21st, heaviest flood ever experienced; bottom lands flooded for miles; much damage to farm and city property. Hodi-mont, 21st, flood almost unprecedented; "streams that have remained quiet the whole year round, excepting for an hour or so after a heavy rain, were converted into broad rivers, rushing with the velocity of a mill-race." Cheltenham, 21st, River des Peres overflowed, flooding all the manufactories of the city; several hundred men thrown out of employment; over 75,000 bricks destroyed. Barret's Station, 21st, Grand Glaze creek bottom, comprising the whole country between this point and the Meramec river, entirely submerged; hundreds of farms divested of fences and out-buildings. This sudden and extensive rise is without parallel in the history of this section of the State. St. Charles 20th, Big Muddy river overflowed and several bridges carried away; considerable destruction of farm property. *New York*: Saratoga, 2d, high water caused great damage to the Adirondack R. R. bridge. Much loss to private property. Thurman, 2d, 400 feet or rail-

road track covered by a heavy land slide. All streams overflowed. Hadley, 2d, heavy land slide covering 100 feet of railroad track; lands submerged and buildings flooded. *North Carolina*: Wilmington, 11th heavy freshet along Black river. At Maultsby's Point, heaviest known for years. Over 30 head of cattle drowned and much other property lost. *Ohio*: Cincinnati, 16th river rising rapidly. 17th, water reached the danger-line, or 50 above low-water mark. 18th and 19th, river rising steadily. 20th, houses on the river front partially submerged compelling the occupants to move their property to the second floors; merchants and manufacturers suffered serious interruption to business. 21st, 4 p. m., river 58 feet and 7 inches above low-water mark or 8 feet and 7 inches above the danger-line; highest water since 1847 when the river rose 63 feet and 6 inches above low-water mark or 13 feet and 6 inches above the danger-line. The highest stage ever known occurred February 17th, 1832 when the water reached 64 feet above low-water mark or 14 feet above the danger-line. In February 1815, the water rose over 50 feet above the low-water mark. The following is an hourly record of the rise as noted at the City Water Works on the 20th: 6 a. m., 54 feet, 5 inches; 7 a. m., 54 feet, 7 inches; 8 a. m., 54 feet, 8 inches; 9 a. m., 54 feet, 9 inches; 10 a. m., 54 feet, 11 inches; 11 a. m., 55 feet; 12 m., 55 feet, 2 inches; 1 p. m., 55 feet, 3 inches; 2 p. m., 55 feet, 7 inches; 3 p. m., 55 feet, 10 inches; 4 p. m., 56 feet; 5 p. m., 56 feet, 3 inches; 6 p. m., 56 feet, 5 inches; 7 p. m., 56 feet, 7 inches; 8 p. m., 56 feet, 8 inches; 9 p. m., 56 feet, 10 inches; 11 p. m., 57 feet, 2 inches; midnight, 57 feet, 3 inches. 21st, over a half a mile of the trestle work on the C. and E. N. G. R. R. was washed away. Many large distilleries and other manufactories compelled to suspend operations. Several hundred houses adjacent to the river front had from one to ten feet of water over the first floors. Along Mill Creek many houses were flooded and several buildings were moved from their foundations. 22d, portion of the track of the C. and S. R. R. washed away. Many hogs and cattle drowned. No trains could reach the various depots, and the Plumb street depot was flooded to a depth of five feet. The railroad between this city and Lawrenceburg was washed away in several places. Great damage caused to the road-bed of the Ohio and Mississippi R. R.; loss to railroad property already amounts to several hundred thousand dollars. Along Mill Creek valley as far north as Cummingsville the torrent of water swept away houses, stables, fences and cattle pens. It is estimated that up to this date about 5,000 persons have been temporarily thrown out of employment. The highest rises since 1859 occurred as follows: 1862, January 24th, 52 feet and 3 inches; 1865, March 8th, 56 feet and 3 inches; 1869, February 22d, 57 feet and 3 inches; 1870, January 19th, 55 feet and 3 inches; 1875, August 6th, 55 feet and 3 inches; 1877, January 2d, 53 feet and 4 inches; 1881, February 18th, 53 feet and 1 inch. Zanesville, 19th, Muskingum river very high and rising rapidly. Marysville, 20th, continuous and heavy rains for the past three days and nights. All streams flooded and the valleys in many places covered with water as far as the eye could reach. Batavia Junction, 21st, water highest for several years past. Several railroad lines abandoned. Akron, 21st, Little Cuyahoga river overflowed; trains delayed by heavy washouts. Lancaster, 21st, nearly the whole of Hocking valley under water; great destruction to farm property. The Hocking river overflowed; everything swept away within reach of the rapidly rising water. Country roads impassable. Fremont, 21st, river overflowed and portion of city submerged. Many people compelled to vacate their homes; considerable damage to railroad property. Mt. Vernon, 21st, incessant rain for past 48 hours; heaviest known for many years. Kokosing river overflowed and several bridges swept away. Germantown, 20th, Twin creek overflowed; several bridges carried away and many thousand acres under water. Carlisle Station, 20th, heaviest flood for years; all streams overflowed with large loss of private and public pro-



erty. Dayton, 21st, Miami river reached the high-water mark of the flood of 1881; no damage to property. Logan, 21st, Hocking river higher than for many years; bottom lands submerged. Gambier, 21st, river overflowed; railroad bridge carried away and much other property damaged. New Comerstown, 21st, incessant rain for the past four days. Tuscarawas river and its tributaries overflowed. Wheat fields submerged and fences swept away. Ironton, 21st, river 43 feet and 8 inches above low-water mark and rapidly rising. Circleville, 21st, Scioto river unusually high; 5 p. m., river within one foot of the highest point ever reached, and rising at the rate of one inch per hour. Heavy washouts on the railroads. Columbus, 20th, Scioto river rose rapidly during the day. 21st, river reached the highest point known for years; a number of cellars in northwest portion of the city were flooded. In some instances people were compelled to abandon their homes. A large quantity of lumber was washed away. *Pennsylvania*: Easton, 2d, Delaware river 23 feet above low-water mark and rising rapidly. River filled with lumber and broken rafts. The lower floors of mills in south Easton submerged and considerable damage done to the locks on the Lehigh and Delaware canals. Harrisburg, 21st, Susquehanna eight feet above low-water mark and rising rapidly. Paxton creek overflowed and much damage in surrounding country. Milton, 21st, heavy rain during past 25 hours caused serious washouts on Pennsylvania R. R. and west branch of Pennsylvania canal; streams considerably swollen; west branch of the Susquehanna river very high. *Tennessee*: Tiptonville, 24th, country flooded some distance from the river; buildings carried away and considerable stock drowned. Memphis, 20th, river remained above the danger-line throughout the month; all bottom lands submerged. The extent of territory in surrounding country endangered by the flood has been estimated as containing a population of 30,000. The estimated loss to the cotton crop has been put at 1,000,000 bales. The known loss in some particulars, attending the flood in this region is 30,000 head of stock and 50 human lives. Railroad travel is "terribly demoralized." *Texas*: Navazota, 10th, Navazota and Brazos rivers overflowed and hundreds of cattle drowned in the bottom lands. Dallas, 12th, almost incessant rain prevailed throughout eastern and northern Texas during the past week. Entire country flooded. People find it impossible to visit the towns for trade. Trinity river overflowed and 20 miles of the Texas and Pacific railroad washed away. Reports from all sections show that the rivers are higher than at any time since the great floods of 1852 and 1866. Large quantities of lumber, cordwood, household utensils, bridge timbers and farm implements, together with numerous small buildings and the bodies of dead animals, floated down the principal rivers and their tributaries. Heavy washouts reported on all railroad lines, and most of them abandoned regular trains. The Brazos river overflowed to an unprecedented extent. Scores of country bridges washed away. Reports from Fort Worth state that Trinity river still continues to rise. Corsicana, 3d, very heavy rains continued without much interruption during the past three weeks. During the night two serious washouts occurred on the Texas and St. Louis railroad. Much other damage in surrounding country. Grapeland, 3d, rain has fallen incessantly for several days past. Water courses higher than for the past 20 years. *Vermont*: St. Albans, 2d, Misisqual, Lamville and Minoski rivers overflowed, causing much damage to private and corporate property.\* Railroad travel suspended. Rivers very much swollen throughout the northern portion of the State. *Virginia*: Petersburg, 14th, in consequence of high water all mills practically ceased operations. Appomattox river higher than for the past five years; water still rising. *West Virginia*: Wheeling, 19th, river 19 feet and 9 inches above low-water mark and rapidly rising. *Washington Territory*: Pomeroy, 28th, snow melting in the mountains, caused a sudden rise in streams; portions of the town were flooded. *High Tides*.—Delaware Breakwater, 21st, unusually high. Chincoteague, Va., 18th, unusually high at 8 a. m.; 21st,

very high from 10 to 11 a. m. Indianola, Tex., 18th, 19th, 20th, 24th, 25th. New York, 21st, very high. Plymouth, Mass., 22d, 3 p. m., violent northeast gale, accompanied by the highest tide for many years. The water invaded the streets and cellars and considerable damage was done at the lumber yards. At one of the yards a large bulk-head was torn away and left in ruins. Swampscott, Mass., 23d, remarkably high tide, overflowing some of the streets. On some parts of the beach the waves dashed to the second story windows of neighboring dwellings. Highest tide for many years. Revere Beach, Mass., 21st, tide so high that it damaged the theatre building, nearly undermining it.

#### TEMPERATURE OF WATER.

*The temperature of water*, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left-hand side of chart No. III. Owing to the presence of ice or the breakage of instruments, observations are wanting as follows: Alpena, 1st to 15th, 21st to 28th; Cleveland, 1st to 10th; Detroit, 1st to 5th, 11th, 12th, 19th to 28th; Duluth, 22d to 28th; Escanaba, throughout the month; Buffalo, 1st to 12th, 23d to 26th; Sandusky, 1st to 12th, 23d to 28th; Chicago, 1st to 5th, 24th; San Francisco, 21st; Marquette, 5th to 28th; Burlington, throughout the month; Milwaukee, throughout the month; Toledo, 1st to 14th; Chincoteague, 21st to 28th; Provincetown, station opened on the 15th; Portland, Me., report too late for publication.

#### ATMOSPHERIC ELECTRICITY.

*Auroras*.—The display of the 17th, the most important of the month, was observed from Sydney, N. B., westward to points in the Upper Lake Region (Grand Haven being the most westerly) and southward to Atlantic City, N. J., the following stations reporting: Bangor, Me., from 10 p. m. until day-break of 18th. Cornish, Me., all night, altitude from 10° to 15°. Dexter, Me., very bright, no beams. Orono, Me., during the evening. Gardiner, Me., 8 p. m. Mt. Washington, 8 p. m. until a. m. of 18th, a faint light of yellowish white color. Burlington, Vt., from 7 to 11.45 p. m. diffuse light, extending upward 30° from the horizon; no streamers or dark segment. Lunenburg, Vt., and Amherst, Mass., during the evening. Westborough, Mass., 7 to 9 p. m. Williamstown, Mass., 10 p. m., bright band of light in northern horizon; altitude about 5° and stretching through 30° azimuth. Fall River, Mass., 9 p. m., to midnight. Harvard College, Cambridge, Mass., auroral arch bright and broad; not seen early, but thought to be visible about 7.30 p. m.; distinct, later; some streamers about 10.30 p. m. Springfield, Mass., first seen at 7.25 p. m. as a mere glow in the west; at ten p. m. it was visible in the north, and until 11.30 p. m., when last observed. Newport, R. I., from 8.30 to 10 p. m., faint, altitude about 10°; azimuth, 45°. New Shoreham, R. I., from 8 to 11.50 p. m. brilliant; it formed an arch about 15° above the northern horizon and 10° in width; well defined luminous beams were exhibited, and often bright flashes of light would extend from 30° to 40° above the horizon. Southington, Conn., diffuse light. Toronto, Can., during the evening. Rochester, 9.30 p. m., dim aurora with a dark segment of 5° altitude, no streamers visible. Waterburg and Ardenia, N. Y., during the evening. Freehold, N. J., 8.45 to 9.30 p. m. low aurora, only a white glow; altitude 10°. Somerville, N. J., during the evening. Moorestown, N. J., low sheet aurora. Readington, N. J., during the evening. Atlantic City, 9 p. m., faint low aurora. Fallsington, Pa., 9 p. m. Mount Forrest, Can., during the evening. Alpena, Mich., 10.30 to 11.30 p. m., aurora consisted of diffuse light without streamers. Thornville, Mich., 8.30 p. m., no rays; merely a dull diffused light, 20° above the horizon; when last observed, at 10.30 p. m., it remained unchanged. Grand Haven, Mich., 8.30 to 9.30 p. m., faint aurora in northern sky; had the appearance of morning dawn; altitude 5°, azimuth,